



STS-109/SM-3B Flight Readiness Review

Networks

Agenda

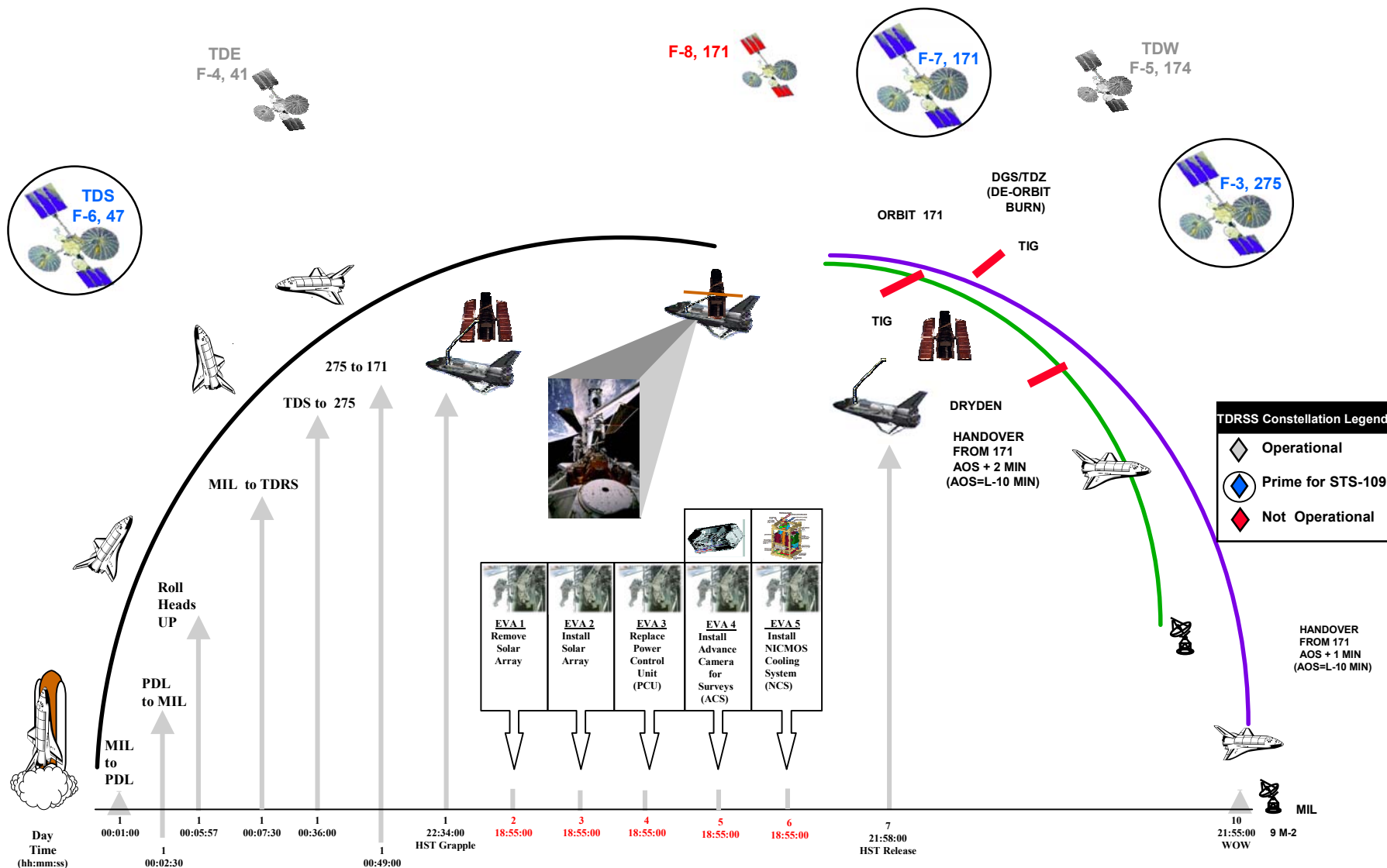


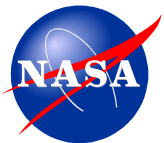
- Integrated Network Activity
- TDRSS Constellation
- Other SN Supported Launches
- STS-108 Anomalies
- Significant Changes
- Configuration Management
- Critical Periods

Ted Sobchak
Network Director
GSFC/Code 450
February 1, 2002



STS-109/HST (SM)-3B Mission and Data Services

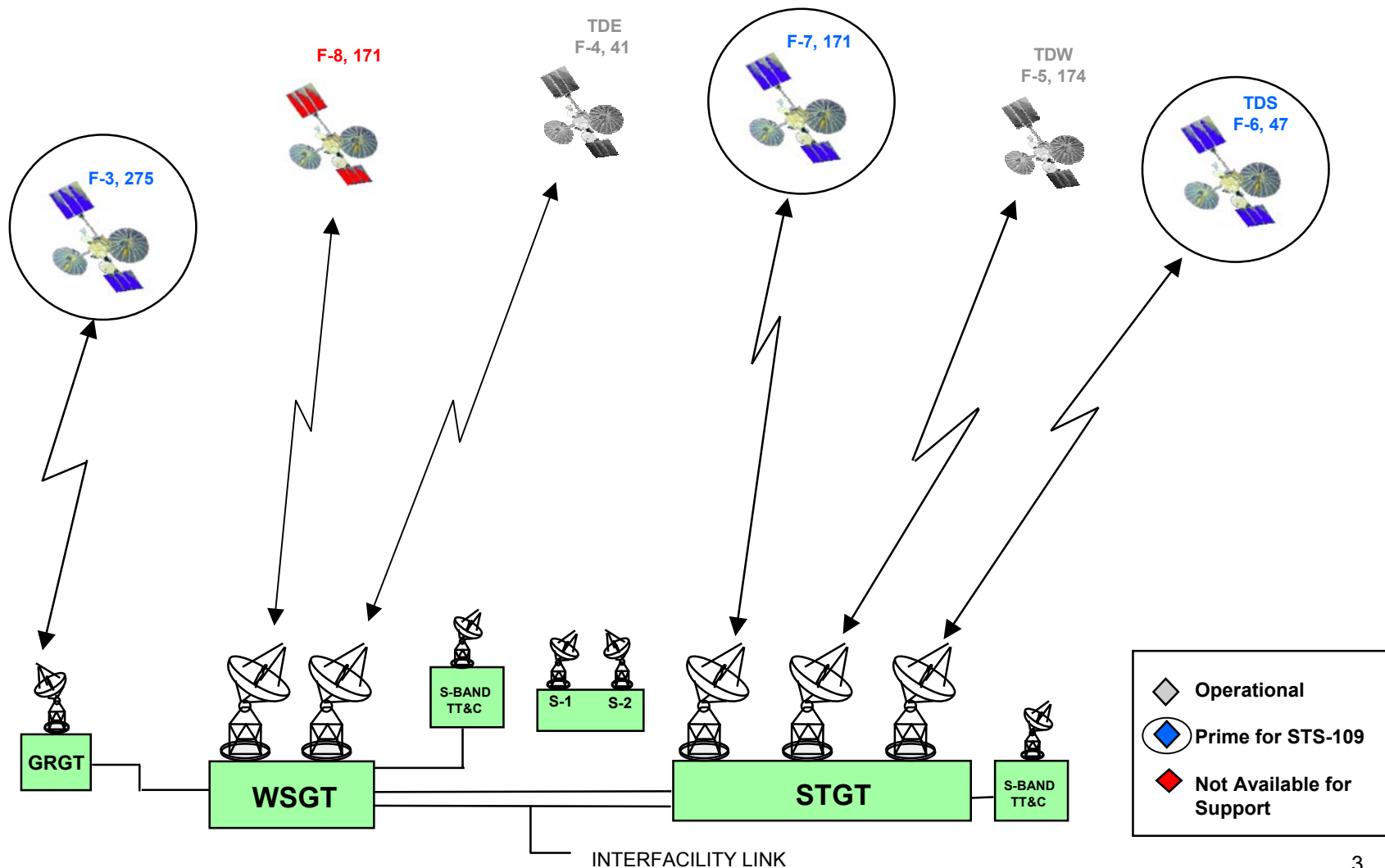


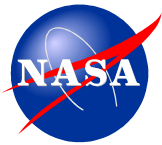


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TDRSS Constellation





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Other SN Supported Launches

- **Currently there are two SN supported launches planned during the STS-109 mission**
 - **AtlasIII/ECHOSTARVII – February 21, 2002**
 - **AtlasII/TDRS-I – March 08, 2002**
 - **The following sites used by Shuttle are also used by TDRS-I :**
 - **Diego Garcia, MILA, WLPS**
- **Potential conflicts to the STS-109 mission are being examined**



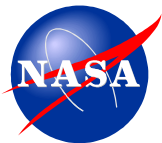
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STS-108 Network Anomalies

- **MILA Exciter #1**
 - **MILA Has Two S-Band Antenna Systems**
 - **Each System has a Prime and Backup Exciter, one of which is required to drive a forward link**
 - **System 1 has Exciter 1 & Exciter 2**
 - **System 2 has Exciter 3 & Exciter 4**
 - **Exciter 1 Experienced Problems Prelaunch**
 - **Switched to Exciter 2 after several hits in the forward link**
 - **Exciter 1 declared no-go for the mission until detailed trouble-shooting could be performed**
 - **System 1 still go on Exciter 2, and System 2 had full redundancy.**
 - **Post Mission work resolved the problem with Exciter 1 and verified operations through testing with JSC and the Portable Spacecraft Simulator**



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STS-108 Network Anomalies

- **MILA Best Source Select (BSS)**
 - Following handover from MIL to PDL the BSS switched to JDI data source
 - JSC observed 3 or 4 data hits (1 sec each). The BSS performed 7 switches causing a total of 7 data dropouts although the source data from JDI was nominal.
 - This anomaly was first identified during the investigation of the PDL Tracking Acquisition Processor (TAP) failure during STS-102 ascent on March 8.
 - Intermittent timing issue in the BSS is key cause
 - Causes variations in frame counts made during a 1 sec. sample of frame sync, such that the sample period may run slightly above or below 1 second due to hardware loading.
 - CSOC developed and installed a fix
 - Delivery was tested with GSFC and JSC using the PSS (Xpndr/NSP), a data simulator, and tape data.
 - A logic statement was added to the algorithm.
 - During the 1 second sample period, before a switch is allowed an error has to have occurred in the data frame sync of the currently selected data source.

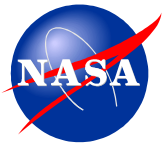


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Significant Changes

- **MILA/PDL**
 - **Install new DQM/BSS software – Version 4135.005 (1/7/02)**
 - **Delivery eliminates erroneous and sporadic BSS switching**
 - **Acceptance Tests successfully conducted the week of January 14**
 - **Switchover to GPS timing at PDL (12/26/01)**
 - **GPS Timing receivers provide Frequency Distribution and Time Synchronization**
 - **Cesium Frequency Standard and Loran-C are backups**
 - **Installed a Microdyne Receiver for Atlas launch scheduled on 2/21/02.**
 - **Performed proficiency passes with STA. Simulated failures at MIL were exercised.**



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Mission and Data Services



Significant Changes

- **Space Network**
 - No impact to STS-109 mission support
 - WSC software delivery to fix TDRS HIJ and Demand Access System (DAS) anomalies.
 - TDRS-8 drifted to 171°W, co-located with TDRS-7.
 - Will not be transitioned into operations for this mission.
- **AFSCN/RTS**
 - BOSS will be unavailable for support due to data switch replacement.
- **DOD Radars**
 - CMTC
 - Down for relocation from CCAFS to Merritt Island from 11/5/01 to 4/15/02
 - No impact to STS-109



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Mission and Data Services



Significant Changes

- **NISN**
 - **Tail Circuits**
 - **NISN identified and blocked 30 “unresolved” circuits on January 14 through STS-109 WOW. Only circuits without owners have been blocked.**
 - **Every effort has been made to make sure these circuits will not impact the launch and the mission. The Networks will conduct a Launch Simulation that interfaces with all stations and supporting elements; GSFC, JSC, KSC, DFRC, OAS, WPS, MIL, DOD Radars and the ROCC to ensure that we have not lost any critical communications.**
 - **Voice Compression**
 - **30 mission voice loops have been compressed at 24 Kbps for the last three Shuttle missions.**
 - **~410 of the 771 mission voice loops will be compressed by February 01.**
 - **Air-to-Ground Voice and TV Conference will not be reconfigured for this phase.**
 - **10 to 15 minutes is required to uncompress the circuits should the need arise**



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Mission and Data Services



Configuration Management

- **Freeze Policy**
 - **Integrated Network freezes are imposed as follows**
 - **MIL/PDL and associated NISN resources - prior to the TCDT**
 - **SN, WLPS, Dryden, FDF & ASSOCIATED NISN resources – Prior to the Space Network Verification/Validation**
 - **AFSCN RTS and remaining NISN resources - Launch minus 5 days**
 - **GSFC Facilities - Launch minus 3 days**
 - **Freeze Exemptions must be approved prior to implementation**
 - **Critical periods for Shuttle and HST are identified prior to the mission and documented in a “Mission Critical Periods Interim Support Instruction (ISI)”**
 - **Maintenance and testing restrictions are imposed for all network elements during mission-critical periods**



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Mission and Data Services



<i>Event</i>	<i>Start</i>	<i>Stop</i>
Launch rendezvous mission	Launch -4 hours	Last rendezvous burn on FD1
Launch non-rendezvous mission	Launch -4 hours	"Go for Orbit Ops"
Payload Deploy/Release	Deploy -3 hours	Final separation burn (+1 orbit delay)
Rendezvous/Docking	2 hours prior to first day of rendezvous burn (~crew wakeup)	Hatch opening (+1 orbit delay for contingency)
Rendezvous grapple/retrieve	2 hours prior to first day of rendezvous burn (~crew wakeup)	Payload berthing (+1 orbit delay for contingency)
EVA(s)	EVA egress -1 hour	EVA ingress +1 hour
Selected assembly/activation/check-out tasks	1 hour prior to start of identified period specified in the Mission Flight Rule Annex	+1 hour from termination of identified period specified in Mission Flight Rule Annex
Reboost Ops	3 hours prior to maneuver to reboost attitude	90 minutes after return to nominal attitude
Undocking	Undocking -3 hours	Final separation burn (+1 orbit delay)
Landing	Touch down -5 hours	Weight on Wheels (WOW)



Identifies critical periods



Space Communications and Data Systems



Certificate of Flight Projects Directorate Networks Readiness

This is to certify that with successful completion of flight readiness preparations and closure of associated action items, all integrated networks and CSOC elements are ready to support the STS-109/Hubble Space Telescope (HST) Servicing Mission (SM)-3B

1/18/02

D. Dillman/NASA
Office of Systems Safety and
Mission Assurance

Date

1/18/02

T. Sobchak/NASA
Human Spaceflight Network Director

Date

1/18/02

J. Walker/NASA
GSFC Center Customer Commitment
Manager

Date

1/18/02

S. Norman/NASA
NISN Representative

Date

P. Johnson/LM
GSFC CSOC Site Manager

Date

1/25/02

J. McKee/DRFC
DRFC Center Customer Commitment
Manager

Date



Space Communications and Data Systems



Certificate of Readiness

Pending completion of flight readiness preparations, remaining standard work and closure of all action items, NASA dedicated elements and all CSOC resources are ready to support the STS-109/Hubble Space Telescope (HST) Servicing Mission (SM)-3B

2/12/02

P. E. Liebrecht

Date

**Associate Director, Program Manager for Mission Services
Goddard Space Flight Center**

2/12/02

G. Morse

Date

**Manager, Space Operations Services
Johnson Space Center**

2/12/02

D. Tighe

Date

CSOC Program Manager